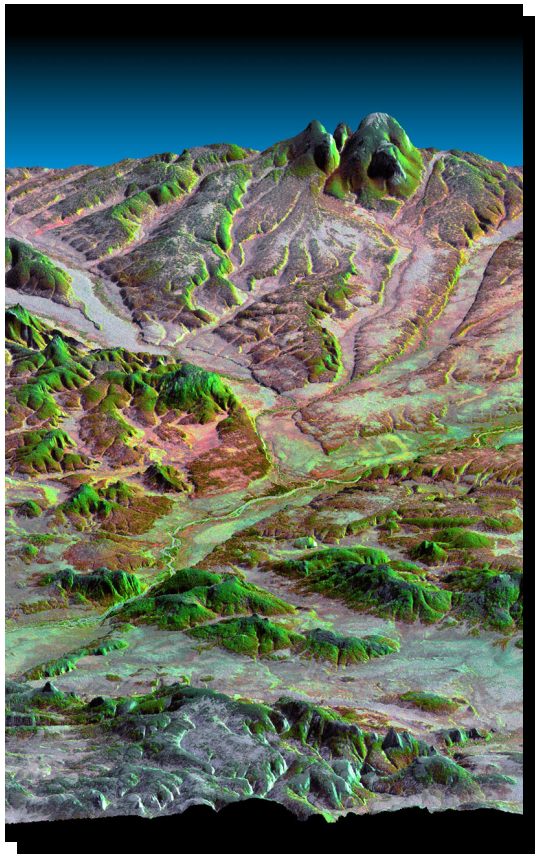
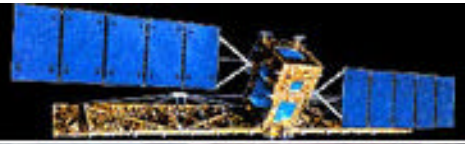

EARTHSAT
What Have We Learned Since Seasat or The Past is Prologue to the Future
Robert S. Winokur
EarthSat
SAR Users Symposium
March 28, 2001

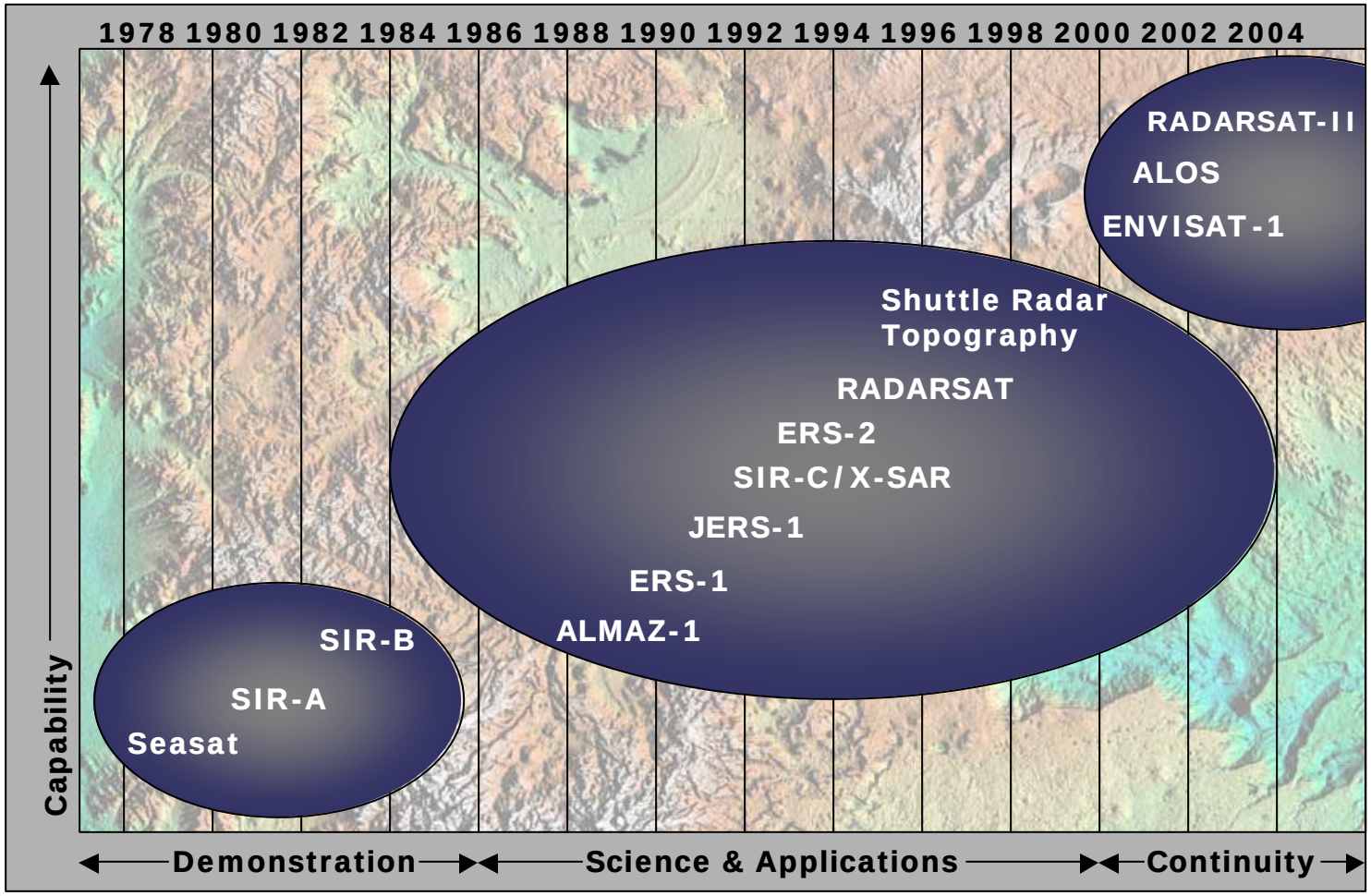
Today's Message: State the Obvious

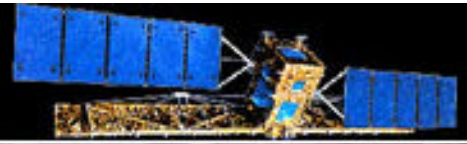
- "History" – where have we been?
- Key accomplishments
- Infrastructure
- Application examples
- Considerations
- The future



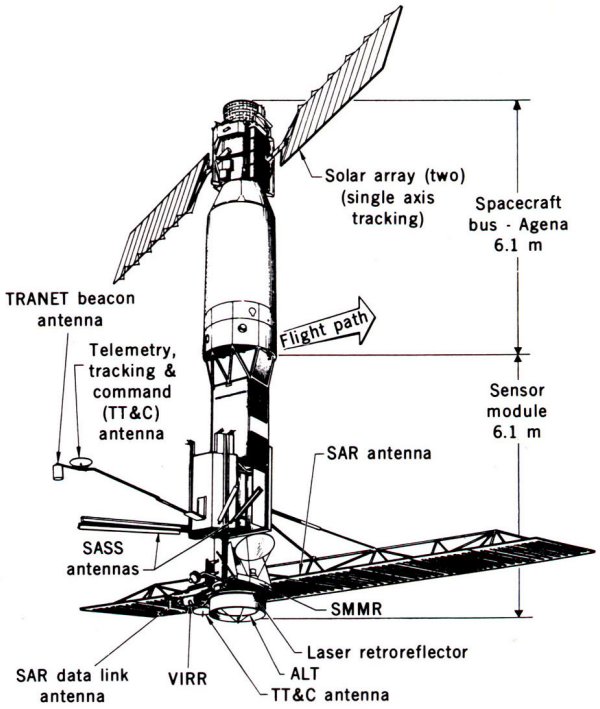


Spaceborne SAR Missions



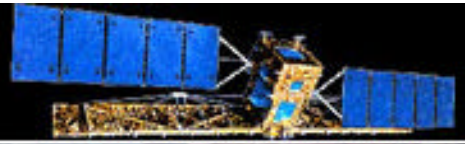


The Early Years - Seasat



Seasat 1978

Seasat Phase A Study
Ocean Spectra Concept - 1974



The Early Years - Seasat

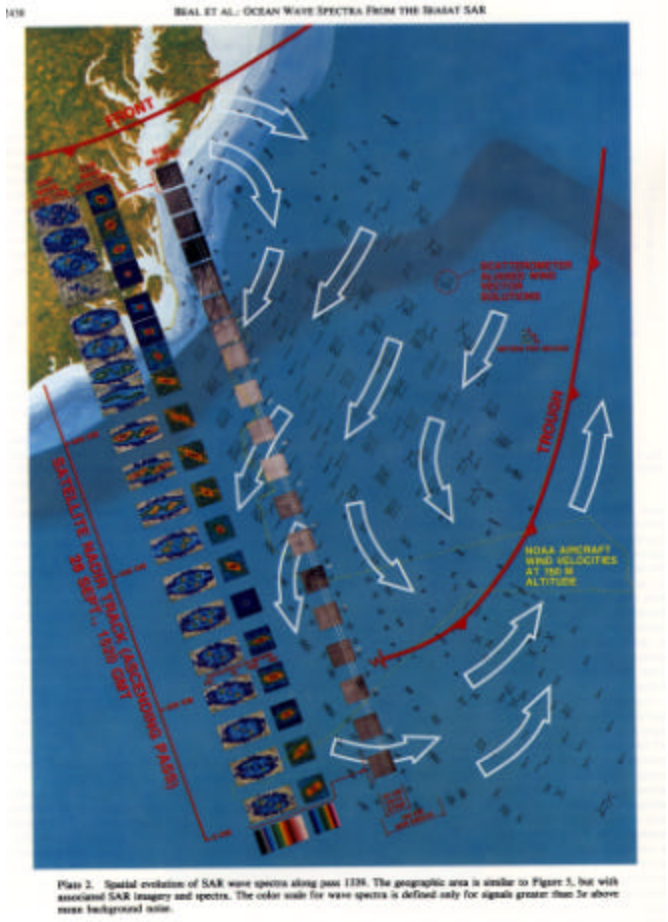


Plate 2. Spatial evolution of SAR wave spectra along pass 1339. The geographic area is similar to Figure 5, but with associated SAR imagery and spectra. The color scale for wave spectra is defined only for signals greater than 3σ above mean background noise.

SAR Wave Spectra

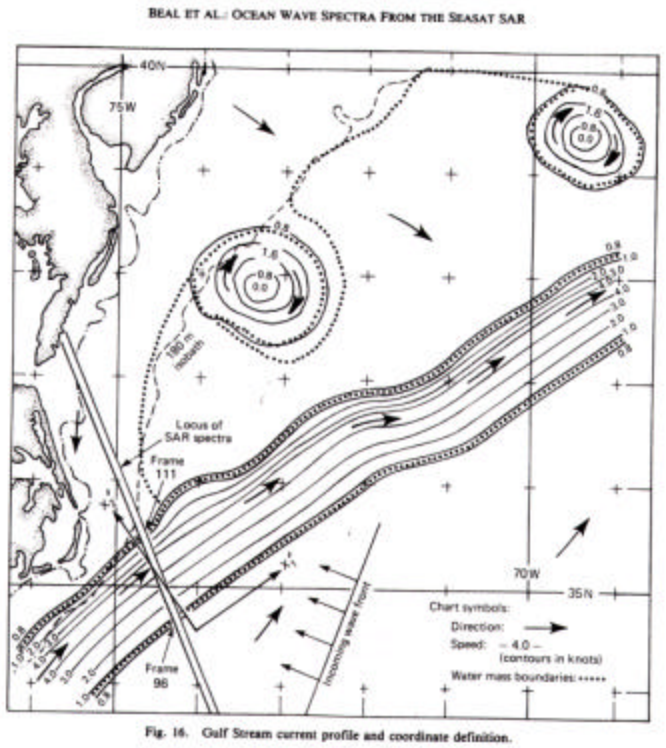


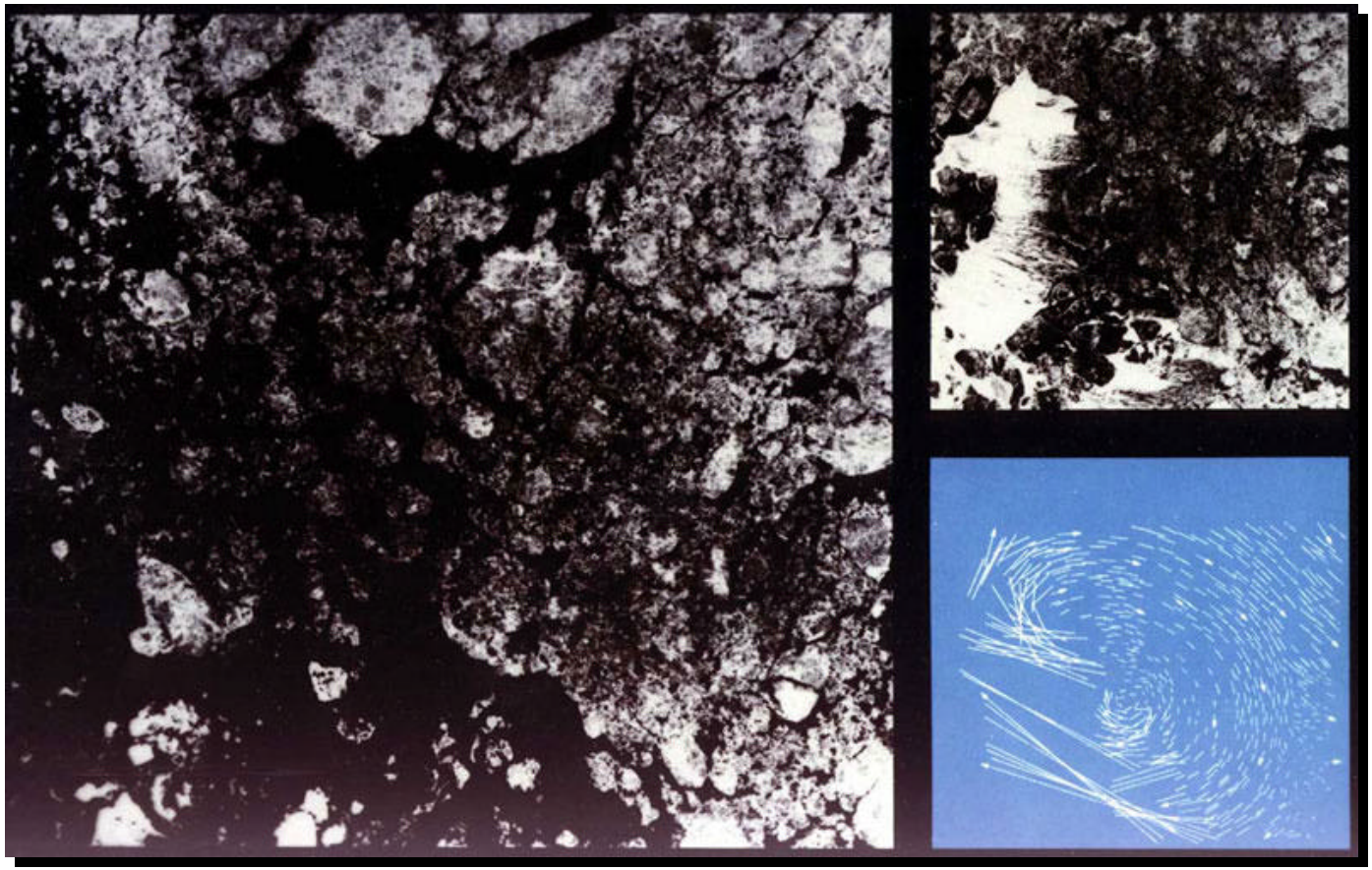
Fig. 16. Gulf Stream current profile and coordinate definition.

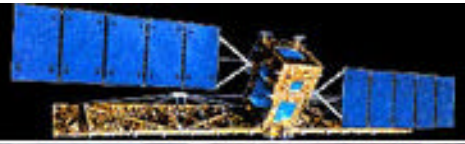
Seasat Pass 1339 September 28, 1978

SAR Imagery Applications - Surveillance

EASAT SAR image of a very long narrow wake and of a fishing fleet in the Irish Sea off Bally-quintin Point near the east coast of Northern Ireland. Data collected on August 10, 1978. Pass 633.

SAR Imagery Applications – Arctic Ice Pack Motion

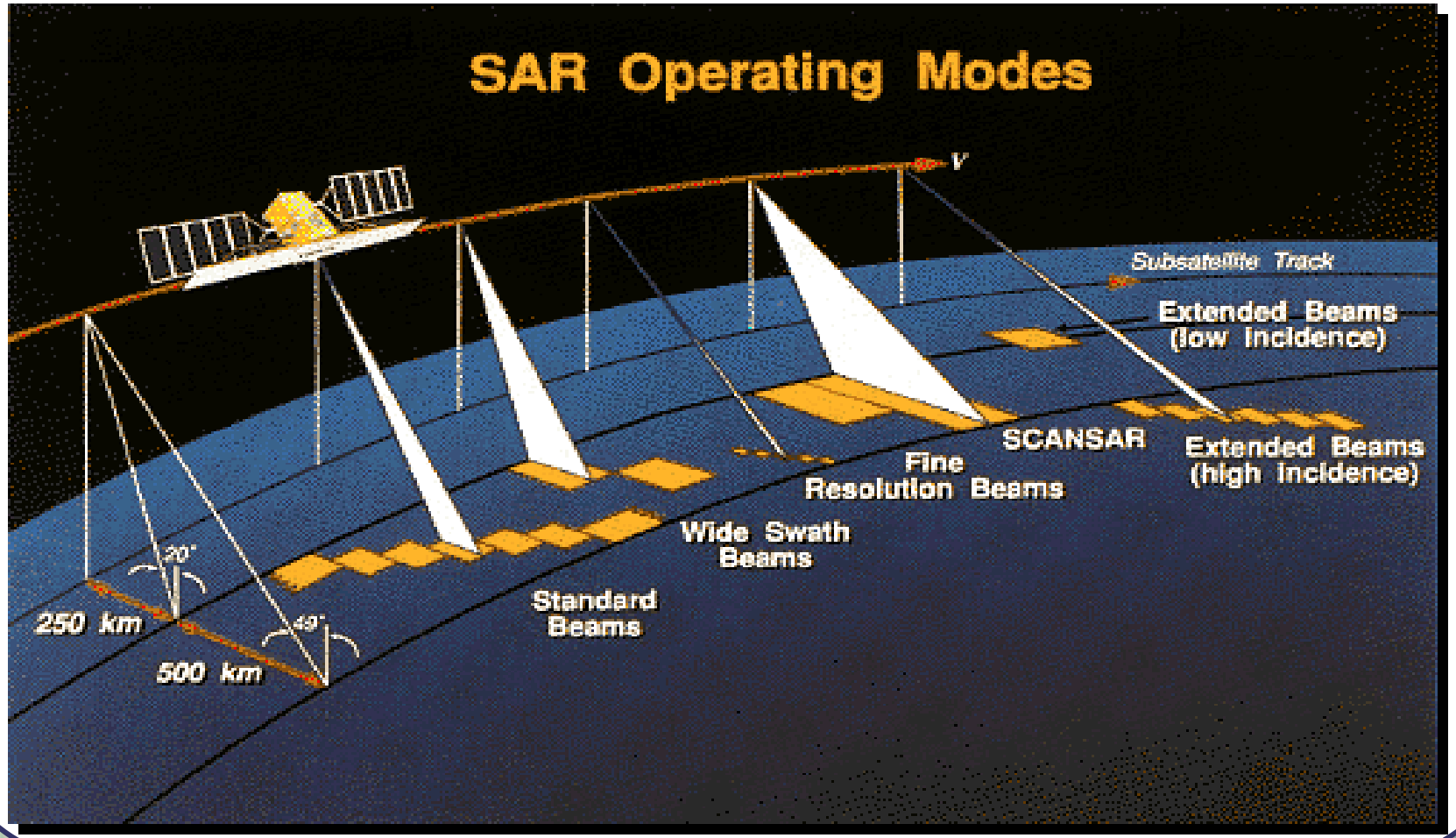




Key Accomplishments and Advances

- Applications demonstrated
- High resolution
- ScanSar
- Multifrequency
- Multipolarization
- Multilooking
- InSar
- Regional to global mapping
- Infrastructure
- Advances in processing, workstations
- Rapid response
- Technology – lightweight antenna, power, size
- Archiving
- Variable angle
- Swath positioning
- GIS compatibility

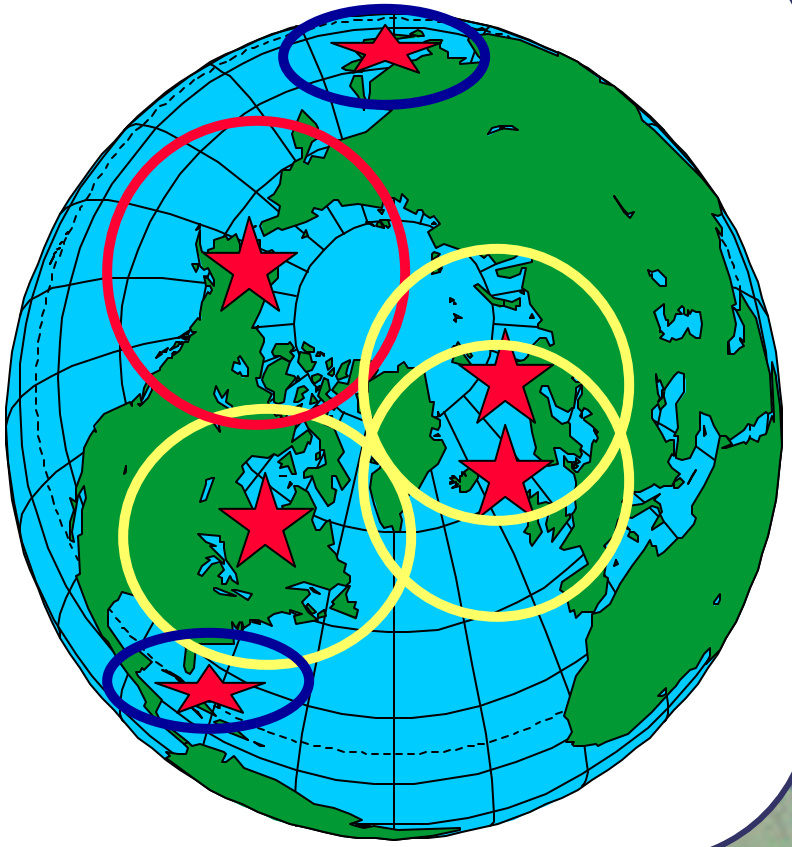
RADARSAT Synthetic Aperture RADAR Data

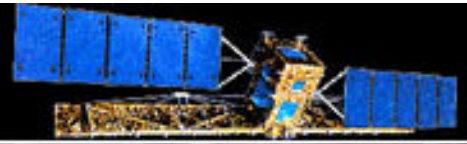


RADARSAT Data Acquisition

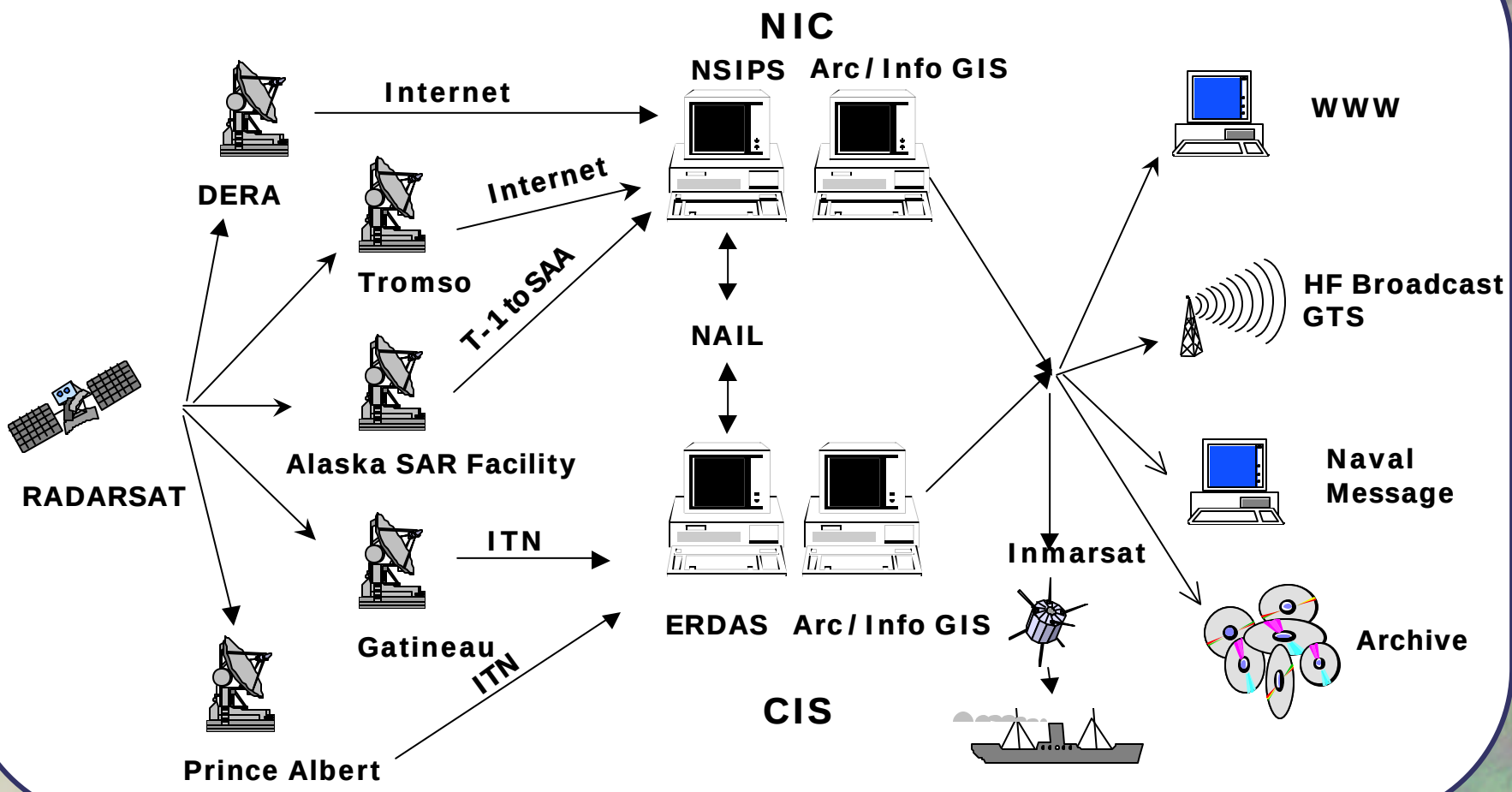
Ground Stations:

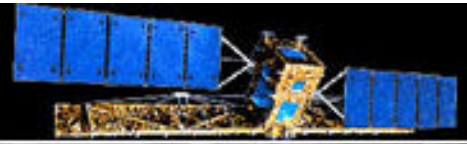
- Fairbanks, AK
- Gatineau, CA
- Tromso, NO
- West Freugh, UK
- China / Japan?
- Puerto Rico?



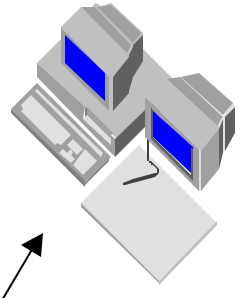


RADARSAT NIC SAR Data Communications Network





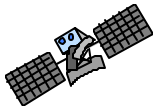
RADARSAT Satellite Active Archive (SAA)



USG Operational Users via subscription or WWW on-line orders

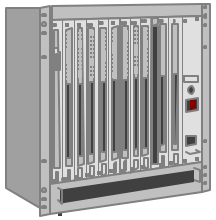
47,953 datasets delivered in 1999 (2.16 Terabytes)

RADARSAT Data

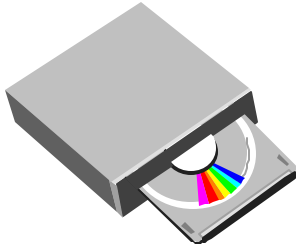


ASF
GAT
TSS
DRA

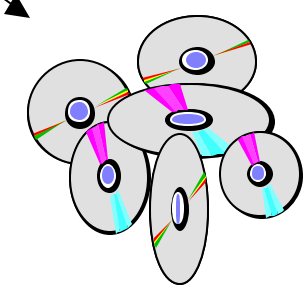
SAA Server



5,861 new Radarsat datasets ingested in 1999

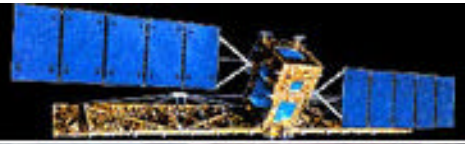


On-line Disk- 1 Week



Near-line Robotic 3 Years

➢ **http://www.saa.noaa.gov**



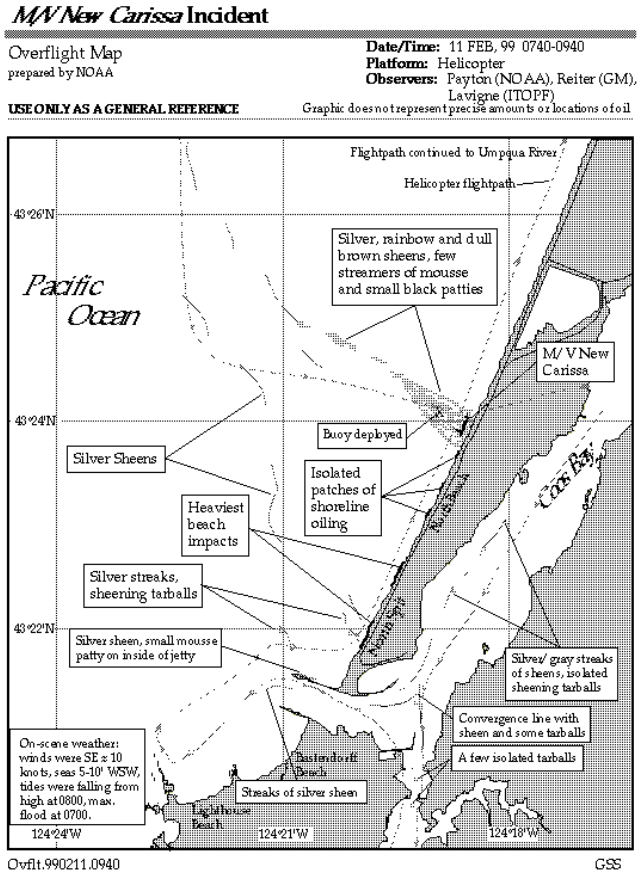
Applications

Broad range of science, operational and commercial applications

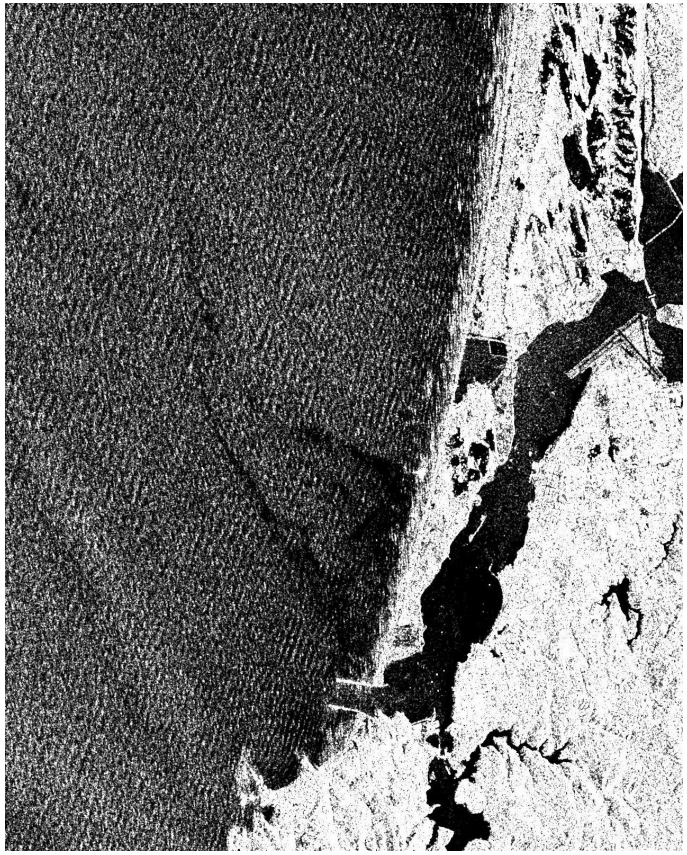
- Ocean
- Mapping
- Disasters and natural hazards
- Land use
- Ice
- Hydrologic cycle
- Agriculture
- Forestry management
- Surveillance

Oil Spill Mapping - M/V New Carissa Oil Spill Near Coos Bay, Oregon

Overflight Map



RADARSAT SAR Image



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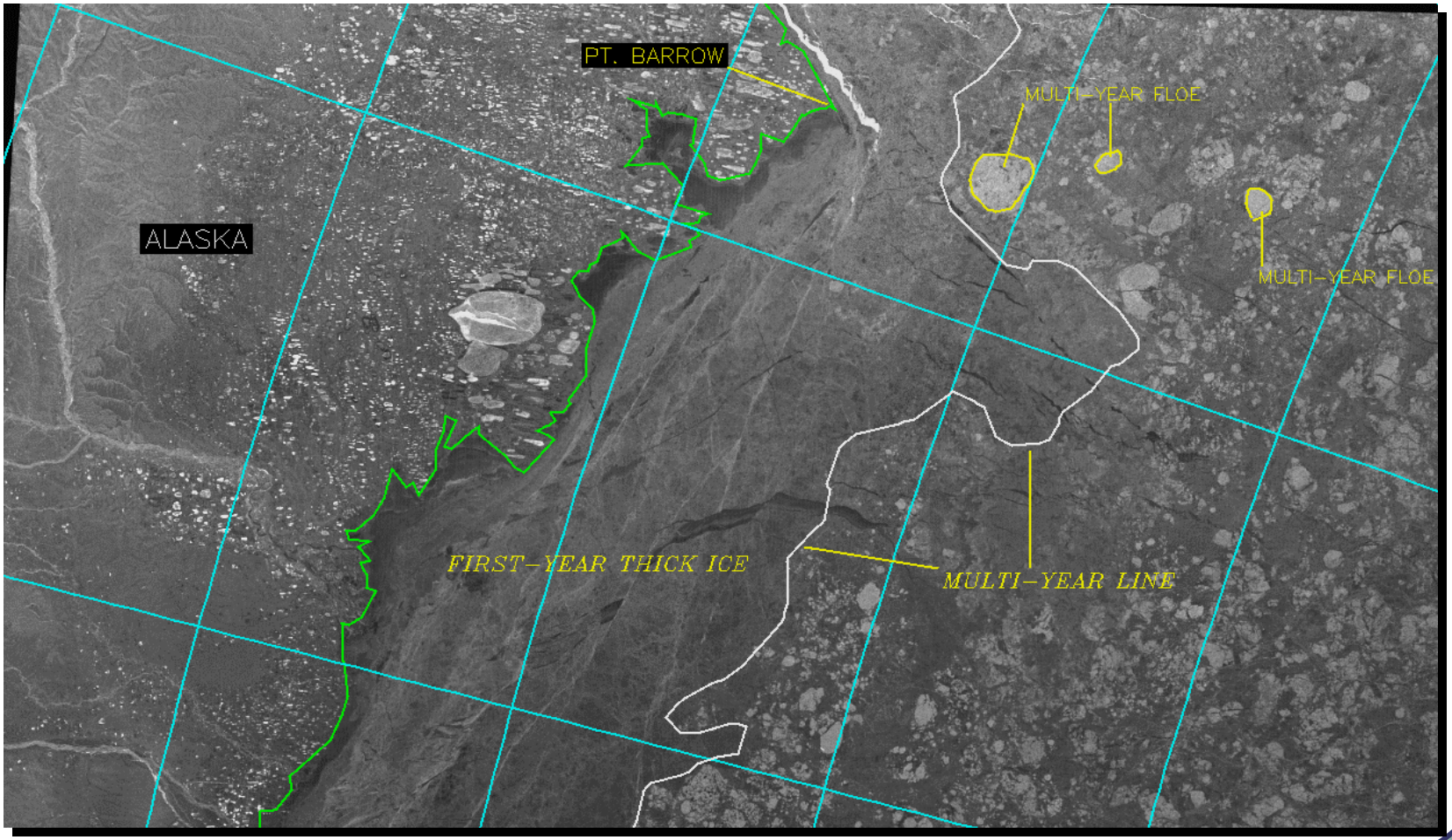
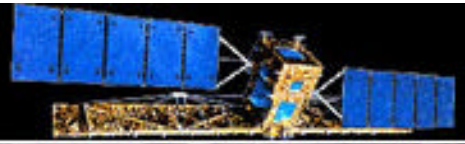
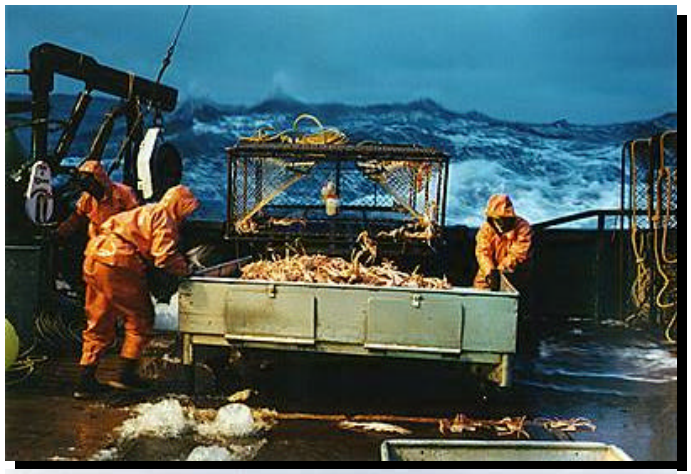
Alaskan Annual Resupply-Prudhoe Bay RADARSAT ScanSAR Data NIC Analysis

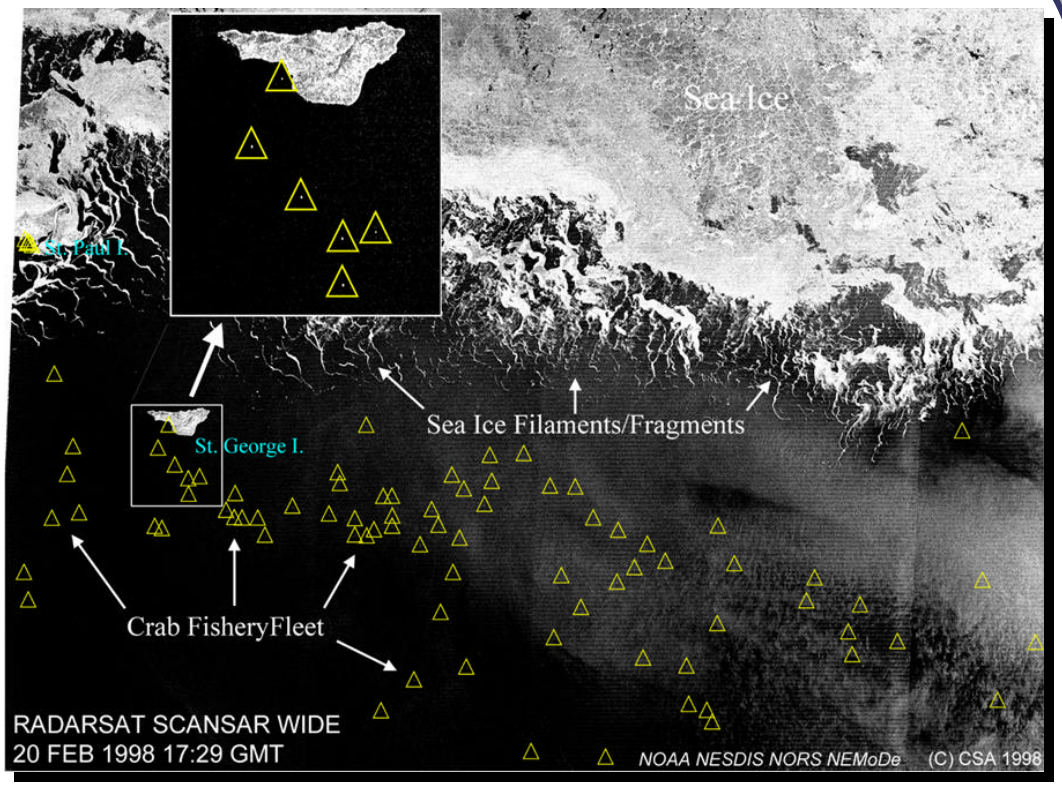


Previous Slide
Menu
Exit
Next Slide



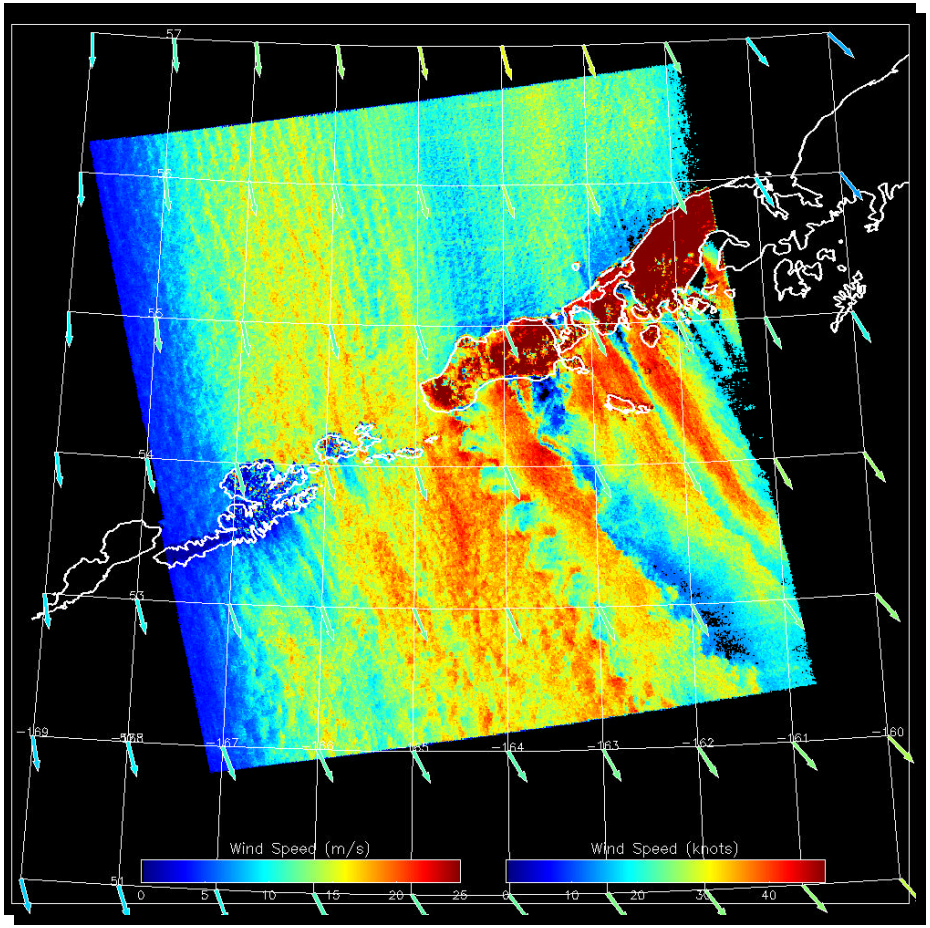
Ice Warnings for Alaskan Fisheries-RADARSAT ScanSAR Data





Bering Sea ice edge and snow crab fishery fleet

Coastal Wind Images from SAR



Wind image derived from RADARSAT ScanSAR Wide B Imagery
12/22/99 04:41 GMT

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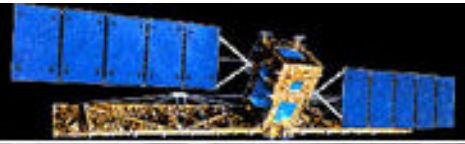
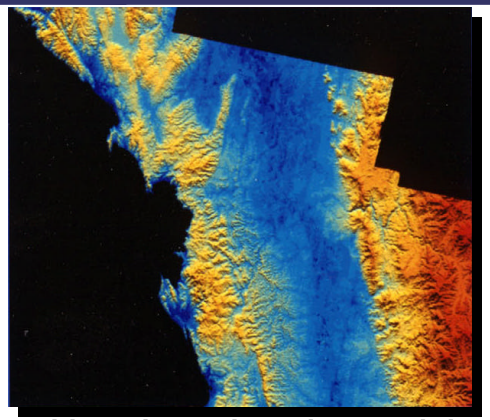
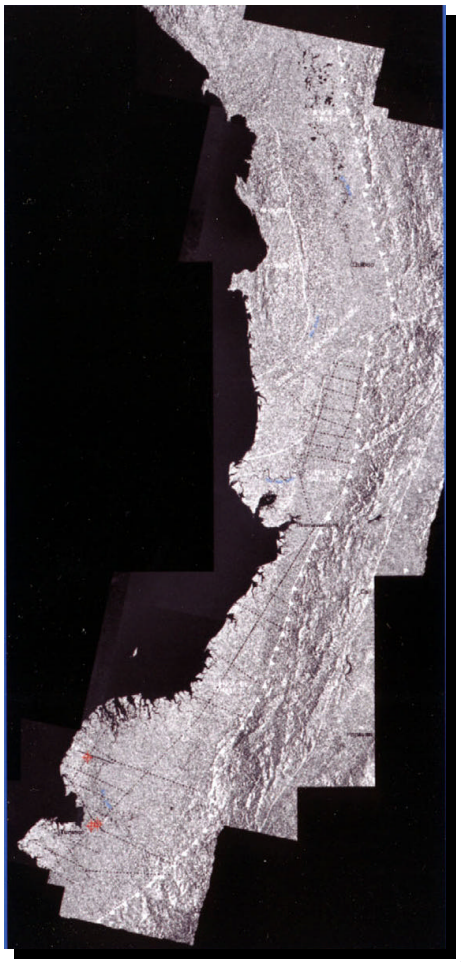


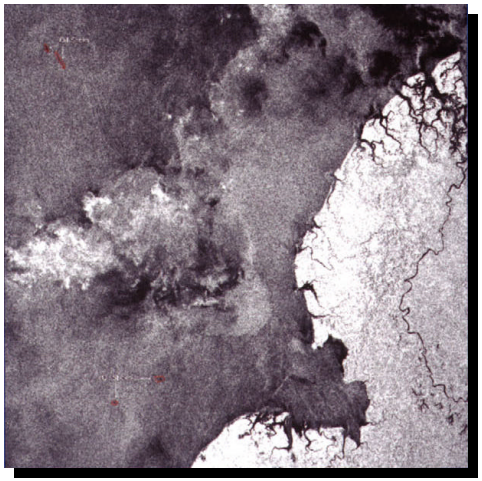
Petroleum Exploration of the Pacific Coast of Columbia



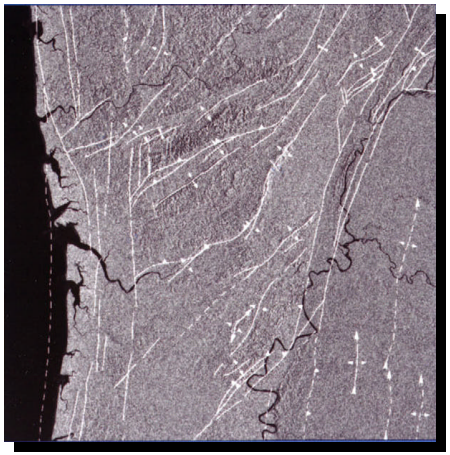
Bahia Solano elevation model

Anaglyph





Offshore oil seeps

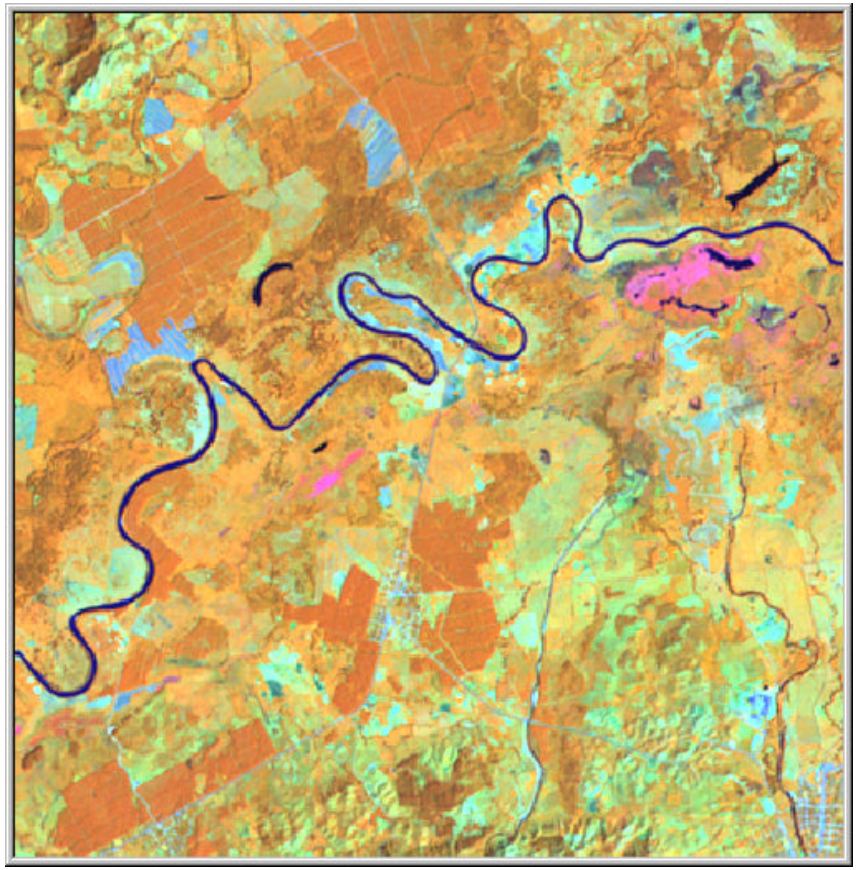


Geologic interpretation

Previous Slide | Menu | Exit | Next Slide

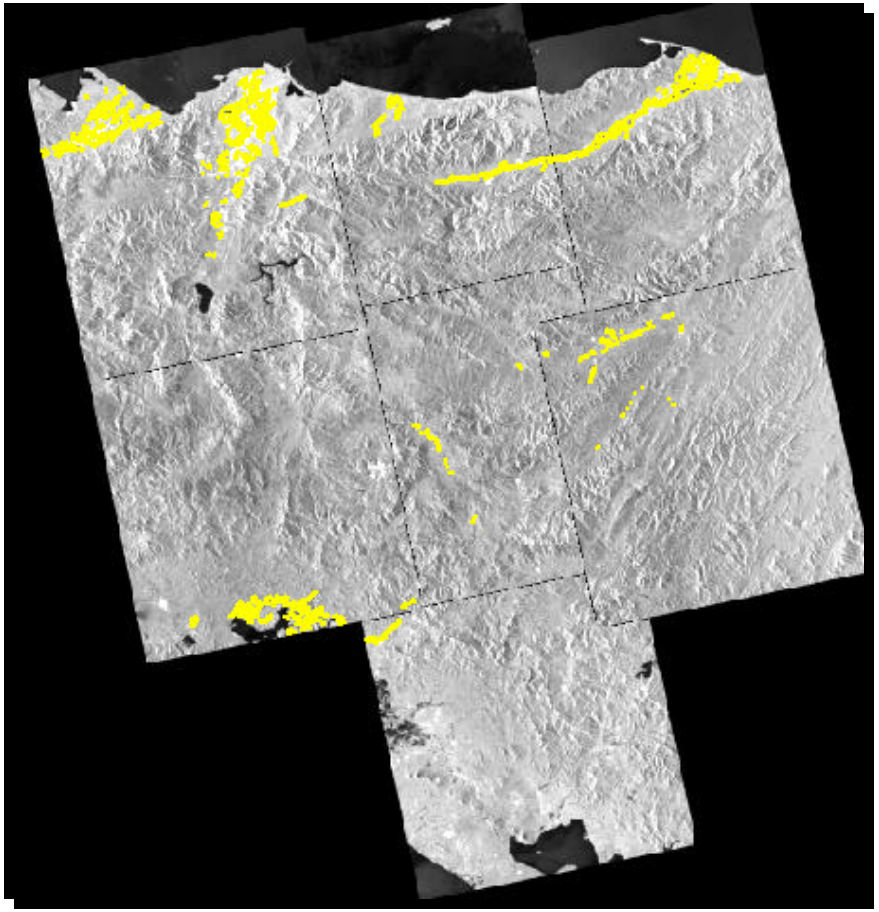
Enlargement of Flooded Agriculture: Honduras-Nicaragua

November 14, 1998



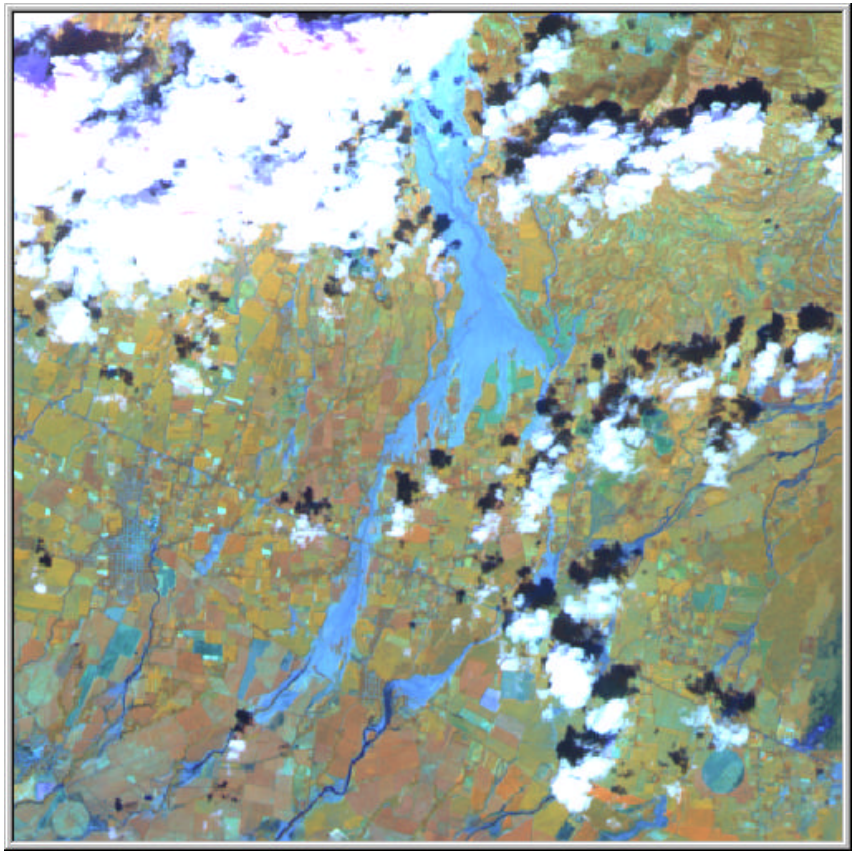
February 23, 1993

Areas with Agricultural Damage: Honduras-Nicaragua

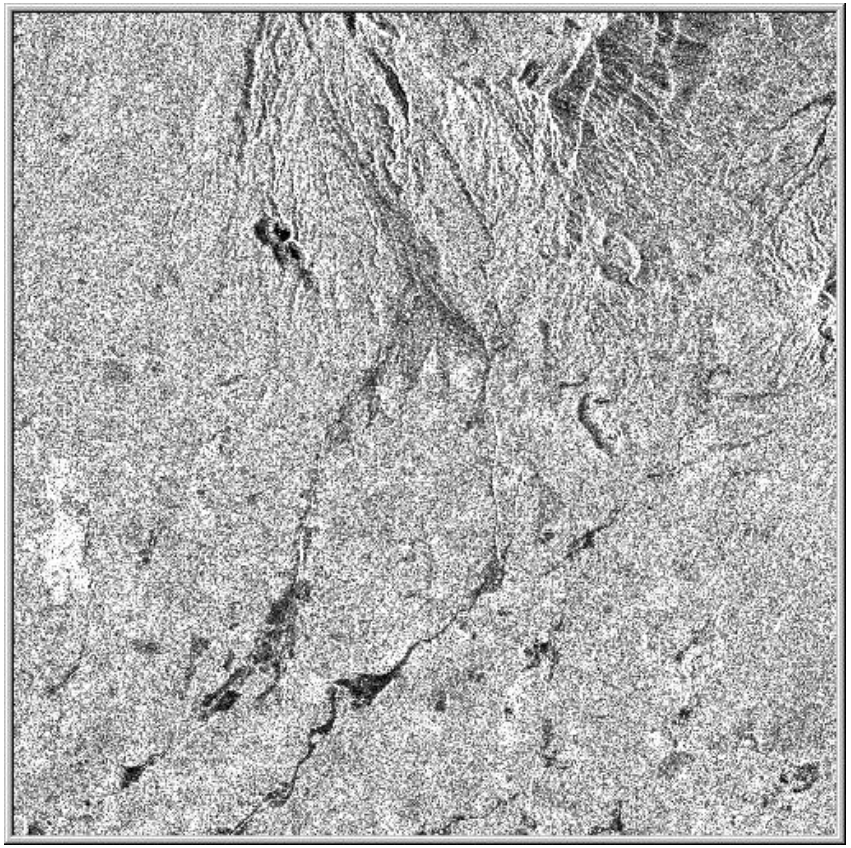


Approximately 106,000 ha of agricultural areas were severely damaged due to inundation caused by Hurricane Mitch based upon interpretation of Landsat TM and RADARSAT imagery

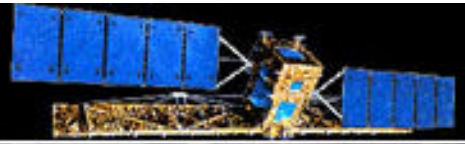
Casita Volcano Mudslide



SPOT 4 Image November 16, 1998

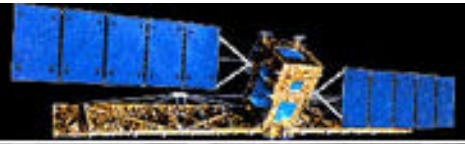


RADARSAT Image November 7, 1998



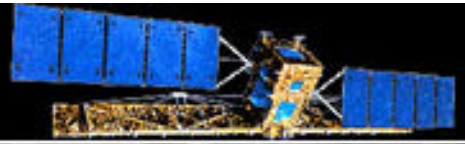
Assured Access Considerations

- Defined user needs and base results in the need continuity
- Coordinated approach for continuity consistent with national, international and commercial needs
- User driven
- Timely upgrades
- Planning for replacements
- Policy constraints and external factors, such as “global observing systems”
- Ensure continuity of data – minimize gaps
- Minimize risk
- Entering the “age of SAR mission continuity”



So, What have We Learned Since SeaSat – A Lot

- Important applications have emerged
- Technology and processing greatly improved
- But, the future is about:
  - Continuity
  - Utility or need
  - Timeliness
  - Affordable access
  - Affordability
  - Partnerships and joint/coordinated planning
  - Planning with confidence
  - Continuity



The End – Out of Time

- On the verge of an unprecedented opportunity
- Build on the past
- But forge a system for the future that is affordable, accessible and continuous
- SAR should be an integral part of the emerging set of national and international partnerships focused on observing systems